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ABSTRACT

A bilingual prediction study was conducted in order to gather information that school districts could use in making decisions about instructional transition for students in transitional bilingual programs. In 1976, 115 third graders were tested in reading, verbal ability, and aural comprehension in both English and Spanish. Attitude toward language and school and demographic data were also recorded. The following year data were collected on English reading tests, teachers' ratings of pupil performance in five subject areas, and individual scores on an observation instrument measuring classroom participation. The data were subjected to a series of analyses that sought to identify reliable predictors of success and to determine the extent to which English proficiency alone could serve as a valid predictor. The analysis suggested that third grade reading skills in English do not offer definite predictive power with regard to classroom participation after transition. Further analyses indicated that English vocabulary skills play a strong role in prediction of success in English reading. These skills plus time-related variables are useful in predicting success in subject matter areas. The particular contribution of all variables varies according to the subject matter area concerned. (AMH)

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PREDICTING STUDENT SUCCESS FOLLOWING TRANSITION FROM BILINGUAL PROGRAMS

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Introduction

In January 1974, the U.S. Supreme Court ruled, in the case of Lau vs. Nichols (414 U.S. 563, 39 L ED 2d 1, 94 Ct 786), that a school district receiving federal funds must ensure that non-English speaking students acquire the basic skills necessary to profit from the regular instruction being provided by the district. In the opinion of the Court,

> there is no equality of treatment merely by providing students with the same facilities, textbooks, teachers, and curriculum; for students who do not understand English are effectively foreclosed from any meaningful education....those who do not understand English are certain to find their classroom experience wholly incomprehensible and in no way meaningful.

The Court found the San Francisco Unified School District, therefore, to be in violation of:

a) section 601 of the 1964 Civil Rights Act which bars discrimination based "on the ground of race, color, or national origin" in "any program or activity receiving Federal financial assistance, "and

b) of the implementing HEW regulations that require districts to "take affirmative steps to rectify the language deficiency in order to open its instructional program to these students."

In the summer of 1975, the Department of Health, Education, and Welfare issued recommendations for meeting the requirements of the Lau vs. Nicols decision. Included among the educational approaches that would constitute appropriate "affirmative steps" at the early elementary grades were bilingual/bicultural education programs and transitional bilingual education (TBE) programs. Both approaches incorporate instruction in the native language of the non-English-dominant student, while introducing English as a second language. Unlike bilingual/bicultural education programs, however, TBE's terminate native-language instruction, "once the student is fully functional in the second language." According to the 1975 HEW re-

commendations, therefore, districts adopting the TBE approach must provide predictive data which show that students are ready to make the transition from Spanish reading into English reading and will succeed educationally in the content areas in the educational programs in which they are to be placed. Thus, if a district elects to accommodate the needs of non-English dominant students through TBE's, the district must furnish some assurance, based on valid and reliable evidence, that those students will profit meaningfully from their educational program, once native language instruction is terminated.

In late 1975, NIE contracted with the Center for the Study of Evaluation (CSE) to initiate a Bilingual Prediction Study for the purpose of gathering research-based information that school districts could use in making decisions about instructional transition. Traditionally, such decisions have been subject to the differing criteria of the classroom teacher or the school. Often intuitively based, they lack the methodological rigor and supportive evidence demanded by HEW guidelines and recommendations. In awarding its contract, NIE perceived a clear need to provide schools with consistent and equitable means for the determination and documentation of pupil potential for success in programs where English is the sole medium of instruction.

The 1976-77 Pilot Study

The initial efforts were devoted to the design and conduct of a pilot study of 115 students in five schools in the greater Los Angeles metropolitan area. The purpose of this pilot study was to explore factors that seem to affect the successful transition of elementary-grade students from bilingual programs to classroom situations in which instruction is provided in English. Particular attention was focused on the role of English-reading proficiency in this transition process, and on the appropriateness and effectiveness of

various test instruments to predict student success following transition. As a preliminary investigative effort the pilot study centered on Spanish-dominant pupils of predominantly native Mexican and Mexican-American origin.

In the spring of 1976, the sample of students, then third-graders enrolled in bilingual programs, were tested on their reading ability, aural comprehension, and verbal ability in both English and Spanish. Measures of their attitudes toward school and language, as well as basic demographic data were also collected. The following year (Spring, 1977), additional data were collected on the same sample of students who were then enrolled in the fourth grade and were receiving instruction in English. The data included pupil scores on state-mandated English reading tests, teachers' ratings of pupil performance in five subject areas, and individual scores on a project-developed observation instrument measuring levels of classroom participation. The follow-up sample consisted of 88 of the original cohort group of 115 students.

The data were subjected to a series of analyses that sought:

(i) to identify effective predictors of success following transition; and

(ii) to determine the extent to which English-reading proficiency alone can serve as a valid and accurate predictor of success following transition.

The data were subjected to regression analysis, which revealed that:

(i) in combination, the array of independent measures proved to be an effective predictor (r^2 = .89) of a combined measure of English-reading proficiency at the third-grade level. Of the independent measures, Spanish-reading proficiency, months of English-reading instruction, English-listening comprehension, and time in the U.S.

accounted for the major portion of variance explained in the dependent measure of English-reading proficiency (r^2 = .84). (See Tables 1 and 2)

(ii) When separate measures of English-reading proficiency were substituted alternatively as the dependent variable, the effectiveness of prediction differed, as well as the relative predictive power of the independent measures. In all of the analyses, however, Spanish reading proficiency proved to be the most stable predictor variable.

(iii) Significant correlations were obtained between third-grade measures of English-reading proficiency as well as fourth-grade teacher ratings of pupil performance in five subject areas. Correlations between third-grade English reading scores and levels of classroom participation in the fourth grade failed to reach statistical significance. (See Table 3)

TABLE 1

Explanation of Variable Names

ZREAD1	Composite of standardized scores on three measures of English-reading proficiency (SOBAR, ECE, and CTBS)
SOBER	Spanish-reading proficiency
ENRDNG	Months of English-reading instruction
SPRDNG	Months of Spanish-reading instruction
TIMEUS	Time spent in the U.S.
TESTGA	English-listening comprehension
PRUEBA	Spanish-listening comprehension
BSMENG	English verbal production (speaking)
BSMSP	Spanish Verbal production
SCHLATTB	Attitudes toward school
TCHRATE	Pre-transition teacher rating (ability to profit from English language instruction)
ENGUSE	Extent of English usage
SEX	Sex of student
AGE	Age of student
TLANGATT	Attitudes toward language
PLEVEL	Level of classroom participation
NCTBS	Fourth-grade CTBS score (English-reading proficiency)
NRATE1	Teacher rating of performance in fourth-grade English reading
NRATE2	Teacher rating of performance in fourth-grade Language Arts
NRATE3	Teacher rating of performance in fourth-grade Mathematics
NRATE4	Teacher rating of performance in fourth-grade Social Studies
NRATE5	Teacher rating of performance in fourth-grade Science

TABLE 2

Summary Table of Multiple Step-wise Regression Analysis,
Using ZREAD1 as the Dependent Measure

(n=47)	Multiple R	R^2	R^2Change	Simple r	B*	Beta**
ZREAD1 with						
SOBER	.621	.386	.386	.521	.306	.701
ENGRDNG	.853	.727	.341	.600	.466	.145
TIMEUS	.895	.800	.073	.514	.306	.386
TESTGA	.917	.841	.041	.531	.165	.250
SCHLATTB	.923	.852	.011	.048	.369	.248
BSMENG	.928	.861	.009	.469	.553	.168
TCHRATE	.931	.867	.006	.468	-.186	-.126
SPDRNG	.936	.875	.008	-.333	-.667	-.164
BSMSP	.938	.880	.005	.062	-.320	-.073
ENGUSE	.939	.882	.002	.324	-.180	-.099
PRUEBA	.941	.886	.004	.233	-.796	-.091
SEX	.942	.887	.001	.159	.163	.030
AGE	.942	.887	.000	-.029	-.282	-.009
(Constant)					-9.953	
Not in the equation: TLANGATT						

*B = Unstandardized beta weight or regression coefficient
**Beta = Standardized beta weight or regression coefficient

TABLE 3

Pearson r Correlation Matrix:
Follow-up Measures of Fourth-grade Performance
with Third-grade Measures of English Reading Proficiency

	Third-grade English reading proficiency			
	SOBAR	ECE	CTBA	ZREAD1
Fourth-grade measures				
PLEVEL	.259 (n=60)	.209 (n=58)	.107 (n=50)	.119 (n=44)
NCTBS	.593* (n=68)	.637* (n=67)	.735* (n=61)	.652* (n=53)
Teacher rating - Reading	.514* (n=72)	.555* (n=71)	.617* (n=62)	.652* (n=54)
Teacher rating - Lang. Arts	.467* (n=69)	.499* (n-68)	.688* (n=62)	.652* (n=54)
Teacher rating - Math	.380* (n=72)	.488* (n=71)	.496* (n=62)	.449* (n=54)
Teacher rating - S. Studies	.402* (n=70)	.516* (n=69)	.460* (n=61)	.412* (n=54)
Teacher rating - Science	.370* (n=70)	.489* (n=69)	.429* (n=61)	.345* (n=54)

* $p < .001$

These results suggest that the use of English-reading proficiency as the sole criterion for transition from a bilingual program may be problematic. Although third-grade English reading skills can effectively predict fourth-grade reading performance and even performance across subject areas, as measured by teachers' ratings, they do not offer definitive predictive power with regard to classroom participation following transition.

To further explore the predictive power of English reading, the measures of reading proficiency were broken down into separate skill areas. A content analysis of items from the three English and one Spanish reading proficiency tests was performed. Items were classified into four language proficiency areas: word attack, syntax, vocabulary, and literal comprehension. For each area, items were combined across the three English-reading measures to create four separate scales of English-reading proficiency. Four similar scales were created from items on the Spanish-reading test. Subsequently, a series of analyses was conducted to determine the contribution to post-transition performance of each of the separate reading scales, as well as the contributions of other background and attitudinal variables. Each post-transition performance measure was treated as the dependent variable in a separate analysis: multiple regression analyses were used in conjunction with post-transition PLEVEL and CTBS scores; discriminant analyses were used in conjunction with the five teacher ratings. Summaries of these analyses are given below, with reference made to Tables 4, 5 and 6.

Table 4 provides a summary of the step-wise multiple regression analysis used to identify those variables that best predict a child's level of classroom participation following transition. Almost 60 percent of the variance in the dependent measure, PLEVEL, can be accounted for by the independent variables

TABLE 4

Summary Table of Multiple Step-wise Regression Analysis
Using PLEVEL[1,2] as the Dependent Measure

(n=33)	Multiple R	R^2	R^2 Change	Simple r	B*	Beta**
PLEVEL with:						
Vocabulary (Sp.)	0.34869	0.12158	0.12158	0.34869	0.4568456	0.45141
Literal Comprehension (Sp.)	0.49931	0.24931	0.12773	0.01739	-0.1942536	-0.36863
Teacher Rating	0.53926	0.29080	0.04148	0.34172	0.4567112	0.76750
Age	0.57424	0.32975	0.03895	-0.13547	-0.1610338D-02	-0.00812
Listening Comprehension (Sp.)	0.62295	0.38806	0.05831	-0.08436	-0.1772663	-0.51750
Month of Reading (Sp.)	0.64293	0.41336	0.02530	-0.01355	0.1021634	0.62949
Listening Comprehension (Eng)	0.67079	0.44996	0.03660	0.19181	0.1305628	0.50768
Word Attack (Sp.)	0.73235	0.53633	0.08637	0.03968	-0.2731022	-0.89766
School Attitudes	0.74503	0.55507	0.01874	-0.01415	-0.1557772D-01	-0.26607
Language Attitudes	0.74877	0.56066	0.00559	-0.02958	0.6448891D-02	0.11975
Sex	0.75276	0.56665	0.00598	0.23657	0.4279448	0.19462
Word Attack (Eng.)	0.75658	0.57241	0.00577	-0.02056	0.5084004D-01	0.30822
Speaking (Sp.)	0.75976	0.57724	0.00483	-0.02058	0.2404023	0.14187
Use of English	0.76442	0.58434	0.00710	0.07480	-0.8892296D-01	-0.11952
Time in U.S.	0.76574	0.58636	0.00202	-0.13933	-0.5994948D-02	-0.19327
Literal Comprehension (Eng.)	0.76730	0.58875	0.00239	0.11708	0.2232013D-01	0.26040
Speaking (Eng.)	0.76910	0.59151	0.00276	0.04686	-0.1857412	-0.13819
Months of Reading (Eng.)	0.77136	0.59499	0.00348	0.07612	0.1948302D-01	0.14642
Syntax (Eng.)	0.77160	0.59537	0.00038	0.02137	-0.3411411D-01	-0.03331
Vocabulary (Eng.)	0.77182	0.59571	0.00034	0.09002	-0.6708936D-02	-0.05531
(Constant)					-0.1426239	

*B = Unstandardized beta weight or regression coefficient
**Beta = Standardized beta weight or regression coefficient

[1]PLEVEL scores were obtained through observation of teacher-led, small-group instructional activities. Using a project-developed instrument, observers recorded the frequencies of pupil responses according to both type (voluntary/involuntary) and quality (correct or appropriate/incorrect or inappropriate). A pupil's final score was calculated as a function of the number of response opportunities available during the observed session. Response opportunities, in turn, were calculated as a function of the time of the session, the total number of pupils in the group and the total number of times the teacher solicited a response.

[2]PLEVEL scores were collected for both the target sample and a random sample of English-dominant pupils in the same classrooms. There were no significant differences between the two groups on the PLEVEL measure.

introduced. Five of these independent variables (Spanish vocabulary, Spanish literal comprehension, teacher rating, age, and Spanish listening comprehension) account for almost 40 percent, with the remaining 15 variables adding another 20 percent of explanatory power.

In Table 5, a summary of the step-wise multiple regression analysis using NCTBS as the dependent measure is given. In this analysis, the 21 independent variables accounted for almost 93 percent of the variance in fourth-grade CTBS scores. English vocabulary (VE) alone accounted for almost 59 percent of the variance. Third-grade teacher ratings added 15 percent explanatory power, and sex, Spanish vocabulary, English literal comprehension and English listening comprehension added another 13 percent.

Finally, Table 6 summarizes the results of five separate discriminant analyses that were conducted to identify the factors that best predict classroom teachers' assessments of post-transition performance in each of five subject areas. Each discriminant analysis sought to isolate, from among the independent variables, those which best account for, or discriminate between, teachers' classification of post-transition performance. In each of the analyses, four discriminating functions were derived; not all of the functions proved to be significant discriminators, but in combination they correctly classified a large portion of the cases (from 68.29 percent correct classification of NRATE4, Social Studies, to 78.05 percent correct classification of NRATE2, NRATE3, and NRATE5, Language Arts, Mathematics and Science). In four of the analyses, English vocabulary made a significant contribution to the major discriminating function.

Discussion

There are some serious limitations to the results of these analyses. Primarily, these limitations stem from the small size of the sample, reduced

TABLE 5

Summary Table of Multiple Step-wise Regression Analysis
Using NCTBS as the Dependent Measure

(n=33)	Multiple R	R^2	R^2 Change	Simple r	B*	Beta**
NCTBS with:						
Vocabulary (Eng.)	0.76804	0.58988	0.58988	0.76804	1.935269	0.44265
Teacher Rating	0.86265	0.74417	0.15429	0.75370	6.247860	0.29130
Sex	0.89532	0.80160	0.05743	0.46550	20.61104	0.26006
Vocabulary (Sp.)	0.91120	0.83028	0.02868	0.64883	11.04239	0.30271
Literal Comprehension (Eng)	0.92241	0.85084	0.02056	0.73079	1.20013	0.33015
Listening Comprehension (Eng)	0.93416	0.87266	0.02182	0.21371	-1.121596	-0.12100
Literal Comprehension (Sp.)	0.94335	0.88990	0.01724	0.55295	-5.605494	-0.29512
Verbal Production (Sp.)	0.95203	0.90637	0.01646	0.45493	10.38223	0.16998
Months of Reading (Sp.)	0.95425	0.91059	0.00422	-0.33796	0.8929993	0.15265
Language Attitudes	0.95600	0.91393	0.00334	-0.38470	-0.1307556	-0.06736
Listening Comprehension (Sp.)	0.95748	0.91676	0.00283	0.28406	-1.908033	-0.15454
Time in U.S.	0.95901	0.91969	0.00294	0.20500	0.8892782D-01	0.07954
Word Attack (Sp.)	0.96000	0.92159	0.00190	0.47367	-1.667760	-0.15208
Syntax (Eng.)	0.96059	0.92273	0.00114	0.48194	1.146311	0.03106
Age	0.96087	0.92327	0.00054	0.00804	0.3805225	0.05326
Months of Reading (Eng.)	0.96108	0.92367	0.00040	0.42593	-0.5064143	-0.10559
Word Attack (Eng.)	0.96150	0.92448	0.00081	0.55160	0.6029184	0.10141
School Attitudes	0.96183	0.92512	0.00064	0.18274	0.1042576	0.04940
Syntax (Sp.)	0.96205	0.92553	0.00041	-0.16017	-1.186768	-0.02343
Use of English	0.96210	0.92564	0.00011	0.19630	-0.8760991	-0.03267
Verbal Production (Eng.)	0.96220	0.92583	0.00018	0.41587	1.382396	0.02854
(Constant)					-81.87505	

*B = Unstandardized beta weight or regression coefficient

**Beta = Standardized beta weight or regression coefficient

TABLE 6

Summary Comparison of Five Discriminant Analyses Using as the Group Classification Variable Teacher Ratings of Performance in Subject Matter Areas

Classification Variable	Discriminant Function	Eigenvalue	Canonical Correlation	Dominant Characteristics of the functions**	Percent Correct Classification
NRATE1	1*	1.61931	.786	English Vocab., TIMEUS	
(English reading)	2	.88543	.685	SPRDNG,AGE	73.17
	3	.55249	.597	Eng. vocab., Sp. syntax,ENGUSE	
	4	.14608	.357	Sp. syntax, SPRDNG,TIMEUS,AGE	
NRATE2	1*	2.27654	.834	ENGRDNG, SPRDNG, TIMEUS	
(Language arts)	2*	1.96908	.814	Eng. vocab., ENGUSE, TCHRATE,TIMEUS	78.05
	3	.83914	.675	Eng. vocab., Sp. lit.comp., SPRDNG, TCHRATE	
	4	.30277	.482	Eng. vocab., ENGUSE	
NRATE3	1*	1.99743	.816	Eng. vocab., BSMENG	
(Mathematics)	2	.94236	.697	Sp. Word attack, SCHLATTB, AGE	78.05
	3	.36161	.515	Sp. Word attack, Sp. lit comp., TCHRATE	
	4	.13203	.341	Eng. syntax, Eng. vocab., Sp. lit. comp., SCHLATTB	
NRATE4	1*	1.68563	.792	Eng. vocab.	
(Social studies)	2	.65278	.628	Sp. Word attack, SCHLATTB	68.29
	3	.21698	.422	Eng. vocab., Sp. Word attack, PRUEBA	
	4	.12009	.327	BSMSP, BSMENG, SCHLATTB	
NRATE5	1*	1.39357	.763	Eng.vocab.,Sp. Word attack,Sp. lit.comp.	
(Science)	2	.70825	.644	SCHLATTB, ENGRDNG	78.05
	3	.31745	.491	Eng.Word attack,Sp.Word attack,Sp.lit.comp., ENGUSE	
	4	.16832	.380	Eng.Word attack,Sp.Word attack,Sp.lit.comp.	

*$p < .05$

**Standardized discriminant coefficient $> .50000$

further by the exigencies of the particular analyses performed. In addition, since the reading scales were created de facto, based on item responses already collected, they probably do not have equivalent discriminatory properties.

Nonetheless, what is important to note from the results of these analyses is the range of variables that contribute to prediction and the differences in the individual contributions of these variables according to the criterion variable being predicted. If performance on a standardized measure of English-reading proficiency is the criterion for post-transition success, then English vocabulary is the most significant predictor, with third-grade teacher ratings contributing considerable strength to the power of the prediction. If performance in a subject matter area is used as the criterion, English vocabulary plays a strong role in prediction of future performance, although other contributions are made by time in the U.S., months of Spanish reading, months of English reading, English-speaking ability and Spanish word attack and literal comprehension skills. The particular contribution of each of these variables differs, in turn, according to the particular subject matter area for which performance is being predicted. Finally, if classroom participation is used as the criterion for post-transition success, Spanish vocabulary, Spanish literal comprehension, teacher ratings, age and Spanish-listening comprehension are the strongest predictors.